WATER BOARD 2017 SPRING TREATMENT SUMMARY FOR MARCH 20 – MARCH 27, 2017

Prepared by Water Board personnel, March 27, 2017.

During the time period of March 20, to March 27, 2017, the Water Board's contractor, TKT Consulting LLC (TKT), continued to perform 2017 Spring Treatment activities at Leviathan Mine. TKT continued siphoning AMD from Pond 2 South to Pond 3 and neutralizing the AMD with the Rotating Cylinder Treatment System (RCTS) March 20th through 27th. TKT discharged neutralized AMD to Leviathan Creek on March 20th, 22nd, 24th, and 26th. 2017 Spring Treatment discharge volumes can be seen in Table 1.

U.S. Forest Service (USFS) Road 31052 from U.S. Highway 395 to Leviathan Mine consisted primarily of packed dirt and mud from March 20 - 27, 2017. At all times the road remained passable with a four-wheel-drive vehicle. No damage to the roadbed occurred due to travel on the road during this time period. Water Board personnel have been in contact with USFS personnel to keep them apprised of road conditions.

Conditions onsite during this time period remained extremely challenging. Morning temperatures were well below freezing and often warmed significantly during the day. Rain and snow showers occurred occasionally. Areas where snow removal occurred remained muddy making work and travel difficult. In some areas the mud continued to dry out. Unplowed areas of the site remained mostly covered by 1-3 feet of snow and continue to necessitate a large amount of labor carrying equipment by hand. Snow onsite, on the south facing hillsides, has mostly melted. Pond 3 remained partially ice covered which continued to make the treatment process challenging due to inefficient mixing. TKT continued to use multiple pumps through holes in the ice in an attempt to expedite the mixing process. Ponds 1, 2 North, and 2 South remained mostly ice covered. See photos 1-4.

Photo 1 – TKT neutralizing AMD in Pond 3 with the RCTS

Photo 2 – TKT neutralizing AMD in Pond 3 with the RCTS, light snow/rain showers

Photo 3 – TKT neutralizing AMD in Pond 3 with the RCTS following light snow accumulation

Photo 4 – Siphon from Pond 2 South into overflow structure to Pond 3 and RCTS

Additional sample results for untreated pond water samples and discharge samples became available and have been added to Tables 2 and 3. TKT continued to collect untreated pond water samples and discharge samples as necessary; analytical results for these samples are still pending and will be added to Tables 2 and 3 when they become available.

On March 20, 2017, Water Board personnel closed the valve that allows AMD to enter Pond 1 thereby isolating Pond 1. Pond 1 was isolated because less than one inch of remaining freeboard was available. AMD from the Adit and Pit Underdrain continue to be conveyed to Ponds 2 North and 2 South. The USGS measurement of Pond stage listed as "Pond 1 Stage" currently measures the stage in Ponds 2 North and 2 South since Pond 1 is isolated. The stage of water contained in Pond 2 North and 2 South, as measured by the USGS and described above, can be seen on Figure 1. Additionally, Water Board and TKT personnel have begun collecting manual measurements of Pond 2 South freeboard. These manual measurements can be seen in Table 4 and appear to better represent actual site conditions than the USGS measurement viewed online due to the effect of ice on the ponds. The available freeboard in Pond 2 South as of March 27, 2017 is 0.32 feet. The combined flow of AMD from the Adit and Pit Underdrain (PUD) as of March 27, 2017 is 76.5 gallons per minute which is an increase of approximately 6 gallons per minute from the combined flow observed one week ago.

The Water Board's contractor, TKT, intends to continue AMD neutralization in Pond 3 throughout the upcoming week. A slight chance of snow showers is forecasted for later in the upcoming week. Water Board personnel will continue to visit the site throughout the upcoming week and prepare the next 2017 Spring Treatment summary on April 3, 2017.

Table 1
2017 Spring Treatment, Leviathan Mine
Pond 3 Estimated Discharge Volume

Date	Estimated Discharge Volume (gallons)
3/4/2017	380,000
3/10/2017	430,000
3/13/2017	326,000
3/16/2017	430,000
3/18/2017	467,000
3/20/2017	394,000
3/22/2017	429,000
3/24/2017	371,000
3/26/2014	399,000
Total Spring Treatment Discharge Volume	**3,626,000**

Table 2
2017 Spring Treatment, Leviathan Mine
Untreated Pond Water Sample Results

SAMPLE ID	Sample Description	SAMPLE DATE	pH	TEMP (°C)	Aluminum			Arsenic			Cadmium			Calcium			Chromium			Cobalt			Copper			Iron			Lead			Magnesium			Manganese			Nickel			Selenium			Sulfate (as SO_4)			Total Dissolved Solids			Zinc		
USEPA Daily Maximum Discharge Criteria			**6.0 - 9.0**		**4**			**0.34**			**0.009**			**NP**			**0.97**			**NP**			**0.026**			**2**			**0.136**			**NP**			**NP**			**0.84**			**NP**			**NP**			**NP**			**0.21**		
USEPA 4-Day Average Discharge Criteria			**NP**		**2**			**0.15**			**0.004**			**NP**			**0.31**			**NP**			**0.016**			**1**			**0.005**			**NP**			**NP**			**0.094**			**0.005**			**NP**			**NP**			**0.21**		
					Result	DQ	EQ	Result	DQ	EQ	Result	DQ	EQ	Result	DQ	EQ	Result	DQ	EQ	Result	DQ	EQ	Result	DQ	EQ	Result	DQ	EQ	Result	DQ	EQ	Result	DQ	EQ	Result	DQ	EQ	Result	DQ	EQ	Result	DQ	EQ	Result	DQ	EQ	Result	DQ	EQ	Result	DQ	EQ
001P3001	Untreated water in Pond 3	2/24/2017	4.27	1.74	7.5	L		ND, 0.001			0.004			95.3			ND, 0.005			0.145	L		0.086			0.30			ND, 0.001			21.1			0.869			0.332			0.002			362	D		513			0.10		
001P1002	Untreated water in Pond 1	2/24/2017	3.05	0.09	36.2	D		0.188			0.004			90.4			0.075			0.22	D		0.127			36.3			ND, 0.001			7.6			1.24			0.577			0.001			587	D		789			0.13		
003P2S004	Untreated water in Pond 2 South	3/7/2017	2.23	0.30	98.7	D		0.894			0.009			53.2			0.236			0.550			0.341			147			ND, 0.001			12.5			2.99			1.47			0.002			1140	D		1680			0.29		
004P2S006	Untreated water in Pond 2 South	3/10/2017	2.69	0.0	67.9			0.403			0.007			39.8			0.170			0.425			0.253			88.7			ND, 0.001			10.3			2.20			1.12			0.003			868	D		1240			0.22		
006P2S008	Untreated water in Pond 2 South	3/14/2017	2.63	0.0	68.9	D		0.256			0.007			38.8			0.180			0.417			0.277			75.8			ND, 0.001			9.9			2.18			1.08			0.002			718	D		1110			0.20		
008P2S010	Untreated water in Pond 2 South	3/17/2017	2.50	0.0	40.9	L		0.06			0.004			23.6			0.087			0.223			0.148			36.3			ND, 0.001			5.8			1.18			0.582			ND, 0.001			450	D		644			0.12		
010P2S012	Untreated water in Pond 2 South	3/19/2017	2.59	0.0	30.8	L		0.035			0.003			17.0			0.064			0.171			0.118			24.5			ND, 0.001			4.4			0.877			0.442			0.002			342	D		469			0.09		
012P2S014	Untreated water in Pond 2 South	3/21/2016	2.36	0.0	22.3	L		0.027			0.002			14.0			0.045			0.123			0.085			17.5			ND, 0.001			3.1			0.649			0.318			ND, 0.001			245			351			0.06		
013P2S016*	Untreated water in Pond 2 South	3/22/2017	2.83	0.0																																															
014P2S018*	Untreated water in Pond 2 South	3/24/2017	3.03	0.0																																															
015P2S020*	Untreated water in Pond 2 South	3/26/2017	2.97	0.0																																															

All values reported in milligrams per liter (mg/L) except pH which are in Standard Units and temperature which are in the units specified above.
All parameters are dissolved except Selenium which is total recoverable.
All results are preliminary
NP - Not Promulgated
NA - Not Analyzed
* - Analytical results pending
Sample result exceedes USEPA Daily Maximum Discharge Criteria

Data Qualifiers (DQ) from the Laboratory:
D - Analyte reporting limit increased due to sample matrix
L - Lowest available reporting limit for the analytical method used
ND - Not detected at the reporting limit, number following ND represents the reporting limit

Table 3
2017 Spring Treatment, Leviathan Mine
Pond 3 Discharge Sample Results

SAMPLE ID	Sample Description	SAMPLE DATE	pH	TEMP (°C)	Aluminum			Arsenic			Cadmium			Calcium			Chromium			Cobalt			Copper			Iron			Lead			Magnesium			Manganese			Nickel			Selenium			Sulfate (as SO_4)			Total Dissolved Solids			Zinc		
USEPA Daily Maximum Discharge Criteria			**6.0 - 9.0**		**4**			**0.34**			**0.009**			**NP**			**0.97**			**NP**			**0.026**			**2**			**0.136**			**NP**			**NP**			**0.84**			**NP**			**NP**			**NP**			**0.21**		
USEPA 4-Day Average Discharge Criteria			**NP**		**2**			**0.15**			**0.004**			**NP**			**0.31**			**NP**			**0.016**			**1**			**0.005**			**NP**			**NP**			**0.094**			**0.005**			**NP**			**NP**			**0.21**		
					Result	DQ	EQ	Result	DQ	EQ	Result	DQ	EQ	Result	DQ	EQ	Result	DQ	EQ	Result	DQ	EQ	Result	DQ	EQ	Result	DQ	EQ	Result	DQ	EQ	Result	DQ	EQ	Result	DQ	EQ	Result	DQ	EQ	Result	DQ	EQ	Result	DQ	EQ	Result	DQ	EQ	Result	DQ	EQ
002DIS003	Pond 3, Treated discharge	3/4/2017	7.64	0.0	3.16			ND, 0.001			0.002			84.3			ND, 0.005			0.068			0.047			0.11			0.002			19.5			0.471			0.163			0.003			262			361			0.05		
004DIS005	Pond 3, Treated discharge	3/10/2017	8.30	0.0	0.19			0.002			ND, 0.001			362			ND, 0.005			0.015			ND, 0.005			0.12			ND, 0.001			20.2			0.263			0.051			0.008			1040	D		1500			ND, 0.01		
005DIS007	Pond 3, Treated discharge	3/13/2017	7.83	0.0	0.24			0.002			ND, 0.001			231			ND, 0.005			0.029			0.008			0.04			ND, 0.001			8.4			0.291			0.083			0.004			617	D		866			0.01		
007DIS009	Pond 3, Treated discharge	3/16/2017	7.67	0.0	0.11			0.001			ND, 0.001			362			ND, 0.005			0.045			ND, 0.005			ND, 0.02			ND, 0.001			12.2			0.724			0.110			0.003			979	D		1460			ND, 0.01		
009DIS011	Pond 3, Treated discharge	3/18/2017	8.55	0.0	3.35			ND, 0.001			ND, 0.001			209			ND, 0.005			ND, 0.005			ND, 0.005			ND, 0.02			ND, 0.001			9.1			0.036			ND, 0.005			0.005			563	D		862			ND, 0.01		
011DIS013	Pond 3, Treated discharge	3/20/2017	8.64	0.0	0.44			ND, 0.001			ND, 0.001			157			ND, 0.005			0.008			ND, 0.005			ND, 0.02			ND, 0.001			7.5			0.251			0.042			0.004			409	D		623			ND, 0.01		
013DIS015*	Pond 3, Treated discharge	3/22/2017	8.80	0.0																																																
014DIS017*	Pond 3, Treated discharge	3/24/2017	8.52	0.0																																															
015DIS019*	Pond 3, Treated discharge	3/26/2017	8.29	0.0																																															

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Table 4
2017 Spring Treatment, Leviathan Mine
Manual Remaining Freeboard Measurements

Date	Pond	Remaining Freeboard (ft)
3/9/2017	Pond 2 South	0.29
3/20/2017	Pond 2 South	0.35
3/22/2017	Pond 2 South	0.28
3/23/2017	Pond 2 South	0.30
3/27/2017	Pond 2 South	0.32

Figure 1 - Leviathan Mine Pond Stage